

### **Amendments to the Claims:**

The listing of claims will replace all prior versions, and listings, of claims in the application:

### **Listing of Claims:**

1-35. (Cancelled)

36. (New) A method for soil management in pasture farming systems, comprising applying a nitrification inhibitor in solution form, fine particle suspension, or crystalline form to treat an entire area of grazed pasture soils, to reduce at least one of (1)  $\text{NO}_3^-$ -N leaching, (2) nitrous oxide emission; and (3) potassium, calcium or magnesium leaching, whereby pasture production in both animal urine patch areas and non-urine patch areas is increased.

37. (New) A method according to Claim 36, wherein the nitrification inhibitor is applied in conjunction with either irrigation water by a spray vehicle, or by conventional method for application of agricultural chemicals.

38. (New) A method according to Claim 36, wherein the nitrification inhibitor is applied in the autumn at a frequency and time that reduces  $\text{NO}_3^-$ -N leaching by about 76% for urine-N.

39. (New) A method according to Claim 36, wherein the nitrification inhibitor is applied in the spring at a frequency and time that reduces  $\text{NO}_3^-$ -N leaching by about 42% for urine-N.

40. (New) A method according to Claim 38, wherein the nitrification inhibitor is further applied in the spring at a frequency and time that reduces  $\text{NO}_3^-$ -N leaching by about 42% for urine-N, resulting in a annual average reduction of about 59%, which is equivalent to reducing  $\text{NO}_3^-$ -N leaching loss in a grazed pasture from about 118 to about 48 Kg N ha<sup>-1</sup> y<sup>-1</sup>.

41. (New) A method according to Claim 36, wherein the nitrification inhibitor is dicyandiamide (DCD), nitrotyrin or 3,4-dimethylpyrazole phosphate (DMPP).

42. (New) A method according to Claim 36, wherein the nitrification inhibitor is in the form of solution or fine particle suspension, whereby permeation of the inhibitor throughout a soil surface layer is enhanced, increasing the soil volume treated and slowing down the decomposition of the inhibitor.

43. (New) A method according to Claim 36, wherein the nitrification inhibitor is applied multiple times to maintain and prolong the inhibition effect in the soil.

44. (New) A method according to Claim 36, wherein the nitrification inhibitor is applied in crystalline form, which allows for its dissolution by rain or irrigation water.

45. (New) A method according to Claim 36, wherein the  $\text{NO}_3^- - \text{N}$  concentration in a drainage water from the grazed dairy pasture soil is reduced from about 19.7 to about 7.7 mg N L<sup>-1</sup>.

46. (New) A method according to Claim 41, wherein a solution of DCD is applied to the grazed pasture at a frequency and timing to increase pasture production from the whole of grazed pasture by more than 15%.

47. (New) A method according to Claim 46, wherein the application of DCD reduces total annual  $\text{NO}_3^- - \text{N}$  loss from about 488 to about 112 kg N ha<sup>-1</sup> y<sup>-1</sup>.

48. (New) A method according to Claim 41, wherein urea is applied at 200 kg N ha<sup>-1</sup> y<sup>-1</sup> throughout the pasture and the pasture is grazed by 3 cows per ha., wherein DCD is applied to the whole area of the grazed pasture soil, and wherein the average annual  $\text{NO}_3^- - \text{N}$  leaching loss is reduced from about 118 kg N ha<sup>-1</sup> y<sup>-1</sup> to about 46 kg N ha<sup>-1</sup> y<sup>-1</sup>.

49. (New) A method according to Claim 41, wherein pasture N off-take as a result of DCD application is increased by an equivalent of about 23% for autumn urine treatments, and about 9% for spring urine treatment, resulting in an annual average of about 16%.

50. (New) A method according to Claim 41, wherein DCD application to the whole area of grazed pasture soil increases pasture yield from about 11.1 t to about 13.0 t ha<sup>-1</sup> y<sup>-1</sup>.

51. (New) A method according to Claim 41, wherein DCD is applied five times in a spring urine treatment, or nine times in an autumn urine treatment, or both.

52. (New) A method according to Claim 41, wherein DCD is applied in a spring and an autumn application each year.

53. (New) A method according to Claim 36, wherein application of the nitrification inhibitor reduces calcium leaching by about 50% (from about 213 to about 107 kg/ha/y), potassium leaching by about 65% (from about 48 to about 17 kg/ha/y), and magnesium leaching by about 52% (from about 17 to about 8 kg/ha/y).

54. (New) A method according to Claim 36, wherein application of the nitrification inhibitor reduces nitrous oxide emission following urine application in the autumn from about 26.7 kg N<sub>2</sub>O-N ha<sup>-1</sup> to about 7.2 kg N<sub>2</sub>O-N ha<sup>-1</sup>.

55. (New) A method according to Claim 36, wherein application of the nitrification inhibitor reduces nitrous oxide emission following urine application in the spring from about 18.0 kg N<sub>2</sub>O-N ha<sup>-1</sup> to about 4.5 kg N<sub>2</sub>O-N ha<sup>-1</sup>.

56. (New) A delivery mechanism for applying a nitrification inhibitor, which is in solution, in fine particle suspension, or both, to the whole area of soil in a grazed pasture system, wherein the nitrification inhibitor reduces at least one of (1) NO<sub>3</sub><sup>-</sup>-N leaching, (2) nitrous oxide emission; (3) potassium, calcium or magnesium leaching, whereby pasture production in both animal urine patch

areas and non-urine patch areas is increased, wherein the nitrification inhibitor is applied in conjunction with either irrigation water, or applied as conventional agricultural chemicals.

57. (New) A delivery mechanism according to Claim 56, wherein the nitrification inhibitor is supplied to an irrigator by a computer controlled system.

58. (New) A delivery mechanism according to Claim 56, wherein the nitrification inhibitor is injected from a supply tank into irrigation water using a flow rate controlled pump connected to an irrigation delivery pipe or irrigation hose.